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CROSS IMMUNITY BETWEEN FOUR STRAINS OF TSUTSUGAMUSHI DISEASE (SCRUB TYPHUS)[1]

By NORMAN H. TOPPING, *Surgeon, United States Public Health Service*

Cross immunity tests have been done in guinea pigs with four separate strains of tsutsugamushi disease virus. Two of the strains, Karp and case No. 9, were from the New Guinea area, the Seerangayee strain was from Malaya, and the Gilliam from the Assam-Burma border. These four strains were selected for their wide geographic distribution. All four strains were well adapted to guinea pigs and were being passed by intraperitoneal inoculations of a liver and spleen suspension (approximately 10 percent). The Seerangayee strain has a high fatality rate and, in order to have a sufficient number of recovered animals from this strain, it was necessary to inoculate guinea pigs subcutaneously. The cross-immunity tests were done by inoculating recovered guinea pigs intraperitoneally with one of the heterologous strains.

The following charts show graphically the results of these tests:

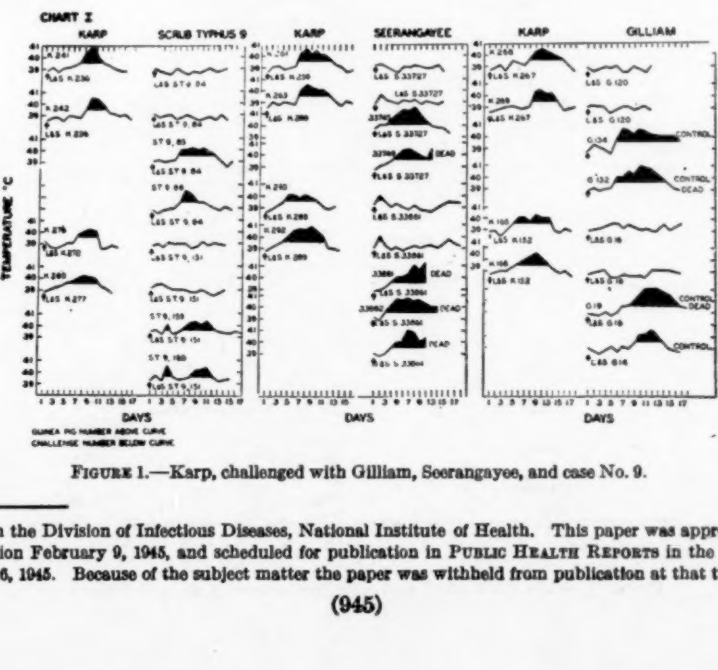

FIGURE 1.—Karp, challenged with Gilliam, Seerangayee, and case No. 9.

[1] From the Division of Infectious Diseases, National Institute of Health. This paper was approved for publication February 9, 1945, and scheduled for publication in PUBLIC HEALTH REPORTS in the issue of March 16, 1945. Because of the subject matter the paper was withheld from publication at that time.

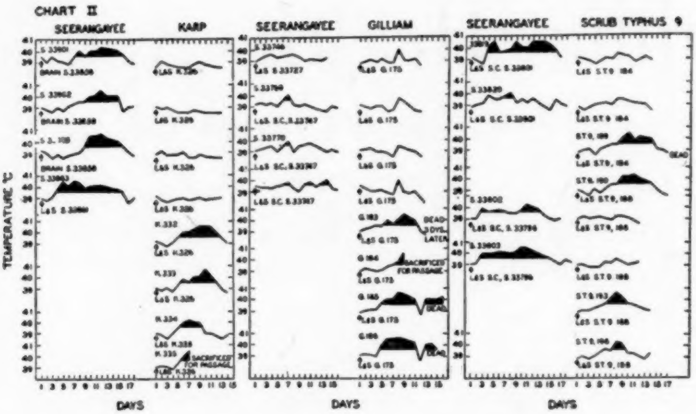

FIGURE 2.—Seerangayee, challenged with Gilliam, Karp, and case No. 9.

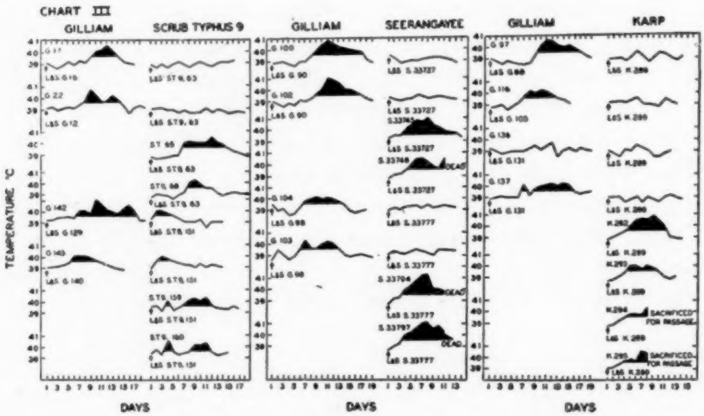

FIGURE 3.—Gilliam, challenged with Seerangayee, Karp, and case No. 9.

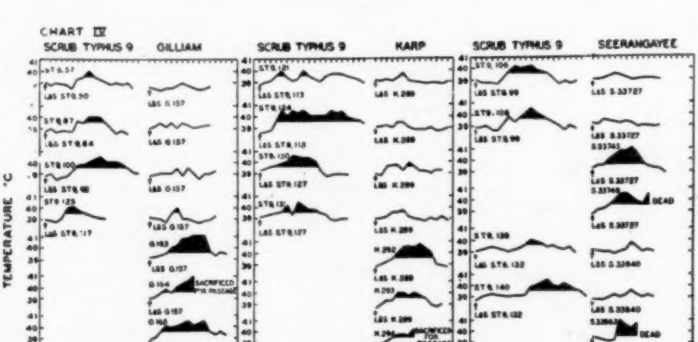

FIGURE 4.—Case No. 9, challenged with Seerangayee, Karp, and Gilliam.

It is clear from the results of these tests that cross-immunity exists in guinea pigs between these four strains of tsutsugamushi disease. The only differences observed in the strains were fatality rates in guinea pigs, the Seerangayee having the highest rate and case No. 9 the lowest, with the Karp and the Gilliam intermediate. The results do not necessarily mean that these four strains are immunologically identical. As an example, cross immunity exists between epidemic and murine typhus yet by other immunological procedures they have been shown to be distinct.

A NEW REACTION TIME APPARATUS AND A NEW METHOD OF ADMINISTERING THE REACTION TIME TEST [1]

By R. B. Malmo, *Passed Assistant Sanitarian (R)*, and L. R. Crisp, *Associate Mechanical Engineer, United States Public Health Service*

One of the chief functions of the psychophysiologist working in industrial hygiene is to provide techniques for measuring the decrement of performance when the organism is operating under extreme environmental conditions. In safeguarding the health of workers, the psychophysiologist is responsible for accurate statements concerning the probable effects of such conditions on the worker's productiveness and his health, insofar as this is reflected in performance on tests. Psychophysiological tests, which are both reliable and sensitive, should help in detecting incipient conditions of ill health, and thereby help in preventing the development of more serious consequences of unfavorable environments.

One purpose of this report is to describe a new portable reaction time apparatus, and to present data indicative of its usefulness. This new apparatus [2] was constructed principally to time a new type of visual discriminative reaction. But it can also be used to measure simple reaction time, and it can be used to time an easy discriminative reaction.

A second purpose of this study is that of appraising a methodological feature which is new in the measurement of reaction time. It is customary to present a series of discriminations at one level of difficulty. But in the present investigation one group of subjects was required to make easy discriminations and more difficult ones in the same block of trials. For purposes of comparison, another group of subjects was given the test under the usual condition of uniform difficulty. Both the new discrimination and the new method of

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[1] From the Industrial Hygiene Research Laboratory, National Institute of Health.

[2] The basic idea and original design for the present apparatus were the product of Dr. John L. Finan (now Major, AGD) while he was Associate Physiologist at the National Institute of Health, early in 1942. Dr. Finan also began the gathering of data to demonstrate the reliability of this test.

presentation were introduced with the idea that automaticity of response would be reduced thereby.

By reducing the automaticity of response, it was hoped that the sensitivity of the test would be increased. In order to examine the sensitivity of the test, it was administered to a group of clinical patients with very mild motor impairments, and to a group of control subjects without such impairments. A reliable difference between these two groups would indicate that the test was of high sensitivity.

In addition to appraising the sensitivity of a test, it is also important to examine its reliability, by which is meant the consistency of the measure when applied to the same individuals at two different times under approximately the same conditions. In the present study, reliability coefficients were determined in the conventional manner.

It is only through such objective appraisals that the probable usefulness of a test can be stated with any degree of accuracy (*4*).

DESCRIPTION OF TEST

This apparatus has six stimulus lights and two response keys. Two lights, a red one on the left and a green one on the right, are placed at the top of an upright panel which the subject faces (fig. 1). Two pairs of lights are placed on the keyboard, one pair back of each response key. The light on the left in each pair is red, and the one on the right is green (figs. 1 and 2). The response keys are depressed disks fastened to the arms of two microswitches which are closed when the subject presses down on the keys.

The present test falls under the head of discriminative reaction time tests. The subject depresses both keys at the beginning of a trial. A "ready" signal is given vocally by the examiner who presents any one of six stimulus patterns 1, 2, or 3 seconds thereafter. Depending upon which pattern is presented, the subject lifts his finger from either the left key or the right one, and his reaction time is recorded by the electric stop clock which is installed at the back of the apparatus so that the subject cannot see it during the test (fig. 2).

There are two different kinds of discriminative reaction which the subject has to make. Stimulus No. 1 and stimulus No. 2 require a very elementary brightness discrimination. A light comes on at the left. The subject raises his finger off the key on the left side. A light comes on at the right. The subject raises his finger off the key on that side. The light on the left is a red one, while the one on the right side is green. But this is not a color discrimination because the subject gets his cue from the position of the light, not its color. The reactions to stimuli Nos. 1 and 2 we have therefore called light-discriminative reactions (L-DR's), and the time required for the reaction, in any trial, will be referred to in this paper as light-discriminative reaction time, or L-DRT.

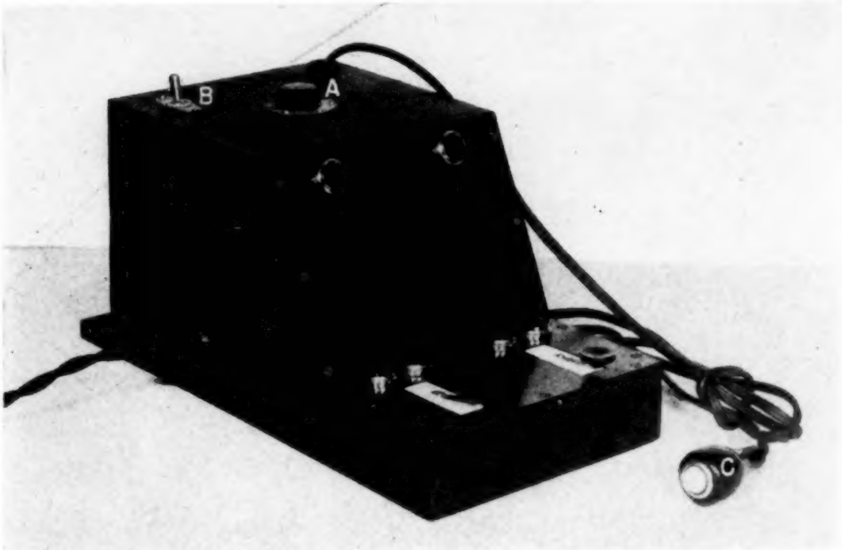

FIGURE 1.—Reaction time apparatus. Front view. A. Rotary switch. Selects stimulus pattern. B. Two-way toggle switch. Selects correct key. C. Push button switch. Turns on stimulus lights, and starts clock.

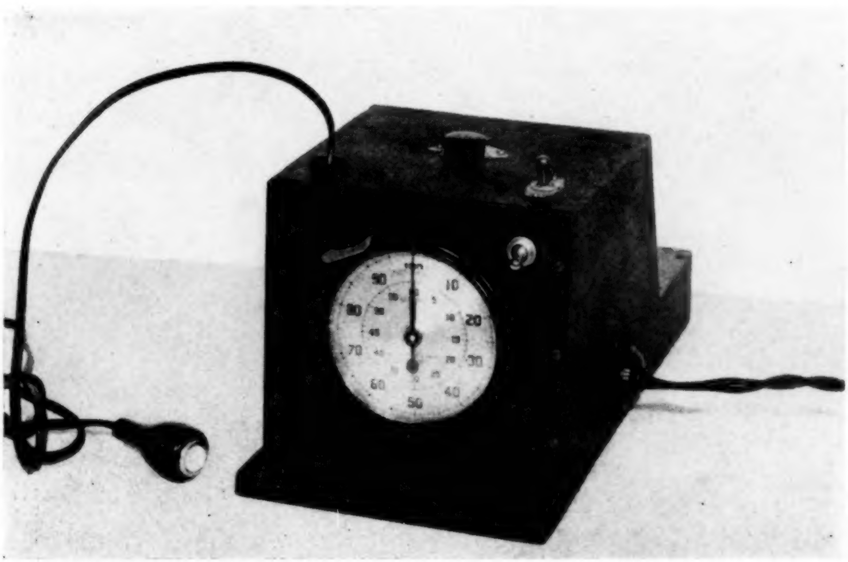

FIGURE 2.—Reaction time apparatus. Rear view, showing stop clock.

c
l
t
c
C
c
g
v
r

t
o
l
5
w
F
b
V
c
u

Successful response to stimulus patterns 3, 4, 5, and 6 (fig. 3) requires a different kind of discrimination. In this, the colors of the lights are important. Figure 3 shows the four stimulus patterns and the correct response for each of these patterns. Inspection of the diagram reveals the cue for correct response. It is color matching. One top light comes on. It is either red or green. Two bottom lights come on, one on each side. One of these is red, and the other is green. If the top light is red, the subject lifts his finger from the key which is next to a red light on the bottom row. The bottom red light may be on the same side as the top light, i. e., the matching light and

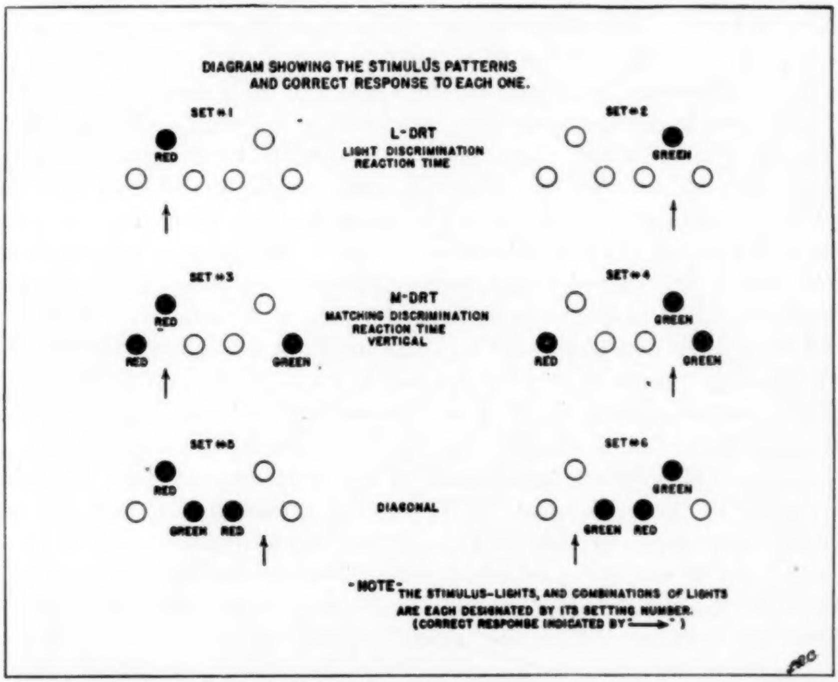

FIGURE 3.—Diagram showing the stimulus patterns and the correct response to each one.

the correct key are vertically placed as in stimulus patterns 3 and 4; or it may be across from it on the opposite side, i. e., the matching light and the correct key are diagonally placed as in stimulus patterns 5 and 6. The subject is correct when he lifts his finger from the key which is nearest to the bottom light matching the top light in color. Reaction time for response to the multilight stimulus patterns we have called matching discriminative reaction time (or M-DRT). Vertical M-DRT refers to the situation in which the matching light and correct key are vertically placed; diagonal M-DRT refers to the situation in which they are diagonally placed.

The test is an easy one to administer. The examiner turns a selector switch (see A, fig. 1) to one of the six numbers. Then he throws the switch (B, fig. 1) forward (for settings Nos. 1, 3, and 6), or backward (for settings Nos. 2, 4, and 5). He is now ready to present the stimulus to the subject, which he does with the pear switch (C in fig. 1). Closing this switch starts the clock and illuminates the stimulus lights simultaneously. The subject stops the clock and turns out the lights by lifting his finger off the correct key. An interval of 5 seconds between trials (the intertrial interval used in the present investigation) allows ample time for the examiner to change settings between trials, and for a record taker to record the RT.

Details of administration.—The subject is seated comfortably before the apparatus. The examiner says, "The test which you are about to take measures the speed with which you can react." The subject is asked to place his forefingers on the keys, and he is shown how much pressure on the keys is needed to just close the switches. The examiner then sets the pointer on the apparatus to the No. 1 setting and presses the button on the pear switch, which turns on the top light on the left side. The subject is told, "Now when you see this light come on, you are to lift your left forefinger from the key as fast as you can. Lift it now, and notice that the light goes out as soon as your finger releases the key." The examiner next sets the pointer to the No. 2 setting, and the subject is asked to lift his right forefinger. The examiner says, "You see, of course, that what you are to do is to lift one of your forefingers just as quickly as you possibly can each time a light comes on. Always lift the finger which is directly below the light which comes on. Your speed of response is measured by this very accurate stop clock at the back of the apparatus." The examiner shows the clock to the subject and explains that it is accurate to one one-hundredth of a second. The subject is asked to press down on the key just released when the examiner says, "Ready," and he is requested not to press down on both keys before the "ready" signal is given.

The examiner observes the reaction of the subject carefully in order to be sure that he releases the correct key, and that he releases only one key, since the release of both keys simultaneously stops the clock.

When the subject understands what he is to do in the L-DRT part of the test, the M-DRT procedure is explained to him. The examiner begins by presenting stimulus pattern No. 3. He says, "Notice the color of the top light which is on. Now lift your finger from the key which is next to the bottom light which matches it." The subject responds, and the examiner corrects him if necessary. The examiner next presents the other stimulus patterns, Nos. 4, 5, and 6. Each time, the examiner gives a "ready" signal and the subject responds to the last three stimulus patterns exactly as he will in the test proper. If the subject depresses both keys before the "ready" signal, or if he

makes an error by releasing the wrong key, or by releasing both keys, the examiner corrects him.

In case the L-DRT trials are to be presented mixed with M-DRT trials, the subject is told to be ready for any one of the six stimuli.

In the present investigations we let subjects "make up" error trials. Whenever a mistake occurred, the examiner said, "Wrong," noted the trial number, and came back to this at a later time during the session. Reaction times were recorded for the correct responses only.

Details of construction.—The apparatus consists of a strongly constructed case made from ½-inch thick plywood, with front and back panels of bakelite. The case, which is mounted on a base 12 inches long, is 6 inches high and 6 inches wide. The front panel is sloped (at an angle of 30° with the vertical) to increase the ease with which top and bottom lights may be viewed simultaneously.

All electrical parts used in construction can be obtained from a radio supply house, with the exception of the rotary selector switch (A, in fig. 1). This switch was designed especially for our RT apparatus. The stationary part of this switch consists of a bakelite disk (diameter 3½ inches) into which are inserted 8 inner contacts and 12 outer contacts arranged in circles (respective radii, ¾ inch and 1¼ inches). Contact arms and their holders and the switch shaft comprise the moveable parts of the switch. Contact arms were screwed to the holder and they were wired through the hollow center of the shaft at the bottom. Switch shaft and contact-arm holder were made as a unit from hard rubber.

A circuit diagram for the apparatus is presented in figure 4. In order to make the diagram easier to follow, the inner ring of contacts is drawn to the side of the outer ring. Actually, G-6 on the inner ring is placed opposite to R-1 on the outer ring in the apparatus.

Switch "B," as shown in figure 1, has been replaced by a General Electric three-way mercury type, No. GE 3010, as this switch is silent in operation.

The six lights used are radio pilot-light brackets, equipped with red and green jewels and 2.5-volt bulbs. All lights are supplied current through a transformer having a 6-volt output and further reduced by a 50-ohm resistor. As lamps G-2 and R-1 are wired direct and not in series they require an additional resistor of 10 ohms each.

Response keys are two microswitches with normally open circuit, and they are equipped with spring leaf actuators on which are secured hard rubber keys.

The circuit is completed by an electric accumulative clock having a 115-volt clutch controlled by a pear-shaped push button, normally open. The clock used in our instrument is one from Standard Electric Time Co., Springfield, Mass., which reads to one one-hundredth of a second.

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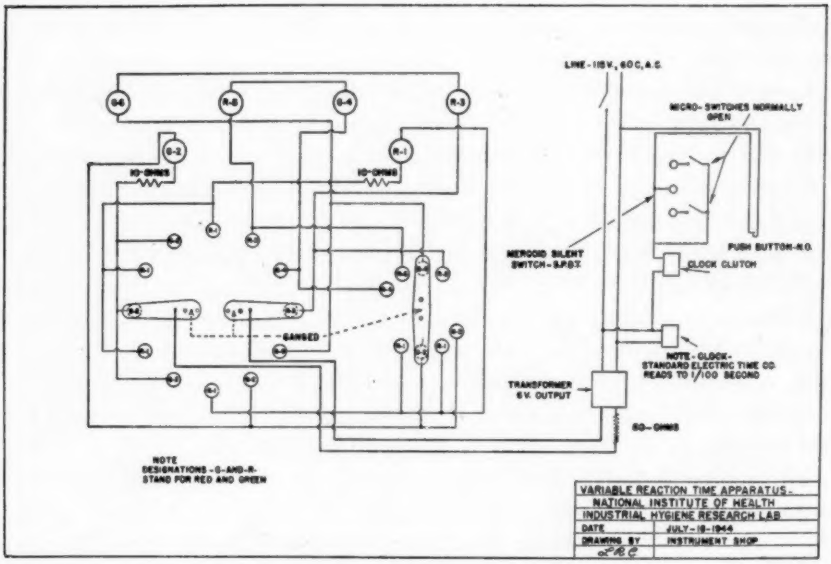

FIGURE 4.—Wiring diagram of the reaction time apparatus.

SUBJECTS

Group I.—Thirty-seven subjects served for one session. Twenty-five trials on L-DRT were given, followed by 40 trials on M-DRT during the same session (condition of separate presentation). The age range for this group was from 17 to 45 years, and the median age was 22 years.

Group II.—Twenty subjects served for 5 sessions under the condition of mixed presentation. That is, 11 trials on L-DRT were presented mixed with 39 trials on M-DRT during each of the 5 sessions. The age range for this group was from 17 to 37 years, and the median age was 21. This group of 20 subjects is divided into 2 subgroups.

Group II-A.—Eleven subjects had also been members of group I during the period from October 27 to October 30, 1943. Thus they had one session of practice with the condition of separate presentation, before their five sessions with mixed presentation, which were given during the period from February 1 to February 13, 1944. The age range for this group was from 17 to 27 years, and the median age was 20.

Group II-B.—Nine subjects had not been tested with this reaction time apparatus previously. The age range for this group was from 18 to 37 years, and the median age was 21.

Group III.—Fifteen subjects served for 1 session under the condition of mixed presentation. Fifty-one trials on L-DRT were presented mixed with 49 trials on M-DRT. The age range for this group was from 26 to 51 years, and the median age was 33. These men were selected to serve as controls for the clinical group.

Clinical group.—In addition to the normal subjects eight ambulatory clinical patients with very mild cases of polyneuropathy served for one session under the same conditions as did the normal subjects in group III. Complaints consisted of paresthesias, sensory losses of distal portions of upper and lower extremities, and mild motor impairment which was less marked than the sensory disturbances. Slight muscular weakness with complete absence of paralysis characterized the motor signs. The age range for this group was from 28 to 47 years, and the median age was 37 years.

Of the 70 male subjects which were used in this investigation, 47 were personnel at the National Naval Medical Center, Bethesda, Md.[3] For the most part these men were medical corpsmen. The other 23 subjects were tested in connection with research investigations which were conducted by the Industrial Hygiene Research Laboratory, National Institute of Health, United States Public Health Service, Bethesda, Md.

RESULTS [4]

There are three points which must be considered whenever the usefulness of a test for the measurement of performance decrement is being considered. These points are (a) practice effect, (b) reliability, and (c) sensitivity.

A practice effect.—Data from group II-B (nine subjects) were used in plotting the practice curves shown in figure 5. This group served for five sessions with mixed presentation of L-DRT and M-DRT. The data were fractionated, so that separate curves could be presented for each of the six different responses.

Figure 5 reveals that after 4 sessions (11 trials per session), further practice appeared not to reduce L-DRT. Likewise, after 3 sessions (19 trials per session) a practice level seemed to have been reached on diagonal M-DRT. But the curves for vertical M-DRT show some slight improvement from session 4 to session 5 (20 trials per session).

It is convenient here to examine the effect of method of presentation upon RT. Notice the single points which are also plotted (see open circles in fig. 5).[5] These points represent the mean RT's for the 37 subjects in group I who took the test under the condition of separate presentation. It is apparent that the L-DRT's were significantly higher under the condition of mixed presentation, while the M-DRT's were lower under this condition. That is, mixing trials on L-DR with trials on M-DR appeared to increase the latencies of the former while decreasing

[3] Thanks are extended to Lt. Bruce M. Fisher H-V (S) and to Ensign James E. Birren H-V (S) of the Naval Medical Research Institute, Bethesda, Md., for making available to us the data which were obtained from testing the hospital corpsmen. It should also be mentioned that these workers, in the course of their testing, were the first to use the method of "mixed presentation."

[4] Mrs. Gwendolyn Murphy, laboratory technician, assisted with the statistical treatment of the data.

[5] It will be noted that the L-DRT values for group I are plotted opposite session 3 in the figure, although only one session was given to this group. This was done to approximate equality of practice for the two groups. Group I had 25 trials during 1 session, while group II-B had only 11 trials per session.

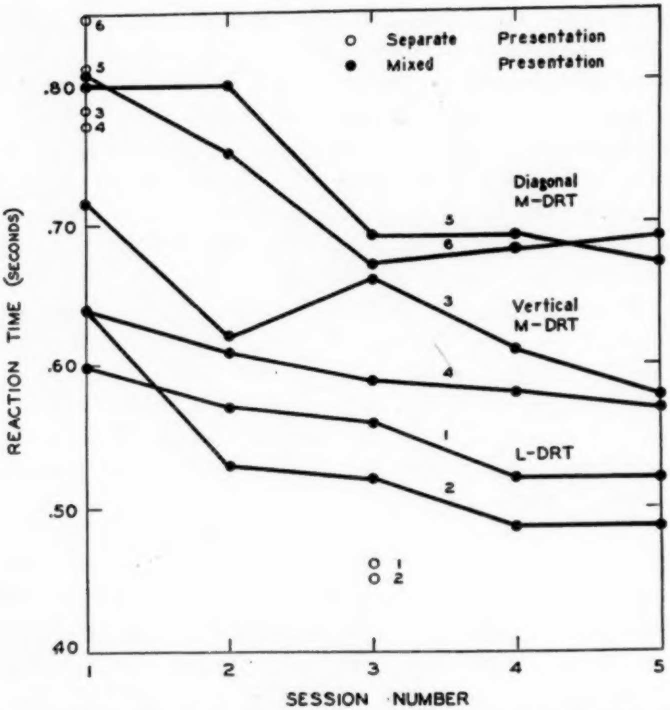

FIGURE 5.—Practice curves. Open circles represent reaction times obtained with the method of separate presentation. Nos. 1 to 6 refer to the particular discriminations, or setting numbers. (See fig. 3.)

the latencies of the latter. Such a decrease was found in all four of the M-DRT's (reactions 3, 4, 5, and 6), but the most marked decreases were in vertical M-DRT, in which the only statistically reliable difference was found (response No. 4).[6]

The increase in L-DRT, which occurs under the method of mixed presentation, can be explained in terms of such factors as expectancy, ocular characteristics of the task, and inhibition. But the decrease in vertical M-DRT does not appear to be explainable at the present time.

Expectancy.—Under the condition of mixed presentation, expectancy is less unified than it is under the condition of separate presentation. On the assumption that divided attention leads to longer latencies than unified attention (*6*) it would be predicted that L-DRT's and M-DRT's would be longer under the condition of mixed presentation. Actually, however, the data show no increase in M-DRT from condition to condition. Indeed, as we have noted, vertical M-DRT appears to decrease. Although increased division of attention may be partly responsible for the increase in L-DRT under the condition of mixed presentation, the same explanation obviously cannot be used to account for the decrease in vertical M-DRT.

Ocular characteristics of the task.—It is probable that ocular components of the L-DR are different under the two conditions of presentation. Under the condition of separate presentation the subject presumably fixates a point in line with and about midway between the two unilluminated top lamps, during the prepara-

[6] It is interesting to note, in addition, that the diagonal M-DRT's appear to be longer than the vertical M-DRT's under both conditions, although the difference is greatest under the condition of mixed presentation; and, as would be expected, the L-DRT's are shortest.

tory interval. Without changing his fixation point he could respond to the light which would fall on his retina near the fovea. Under the condition of mixed presentation, on the other hand, the subject presumably fixates a lower point, and consequently the retina would be stimulated at a point farther from the fovea under this condition. It is possible, further, that some subjects may glance downward in making the discrimination between L-DR and M-DR. With these considerations in mind, it may be reasonably argued that the increased latency for L-DR under the condition of mixed presentation is due, at least partially, (1) to appearance of the stimulus farther in the periphery of the retina. The latency of a simple reaction to a standard visual stimulus presented in the periphery of the retina may be as much as 44 percent greater than the latency of reaction to the same stimulus presented in the fovea (*2*). (2) Eye movements downward. The increase in L-DRT, we found, roughly approximates the mean ocular latencies for such eye movements (*1, 5*). These are points which could be settled only through direct measurements of the positions and movements of the eyes during testing.

It is quite possible, then, that visual factors are involved in the increased latency of L-DR under the condition of mixed presentation. It is also likely that these factors help to explain why diagonal M-DRT is longer than vertical M-DRT. Response to peripheral stimulation and necessity for eye movements would seem to characterize diagonal M-DR more than they do vertical M-DR, because in the diagonal M-DR the matching stimuli are more widely separated. But the decrease in vertical M-DRT obviously requires some other explanation.

Inhibitory factors.—It was very easy to find an explanation for the increase in L-DRT in terms of expectancy and in terms of ocular factors. This result does not present any difficulty, either, for an explanation in terms of inhibitory factors. Under the condition of mixed presentation there are possibilities for inhibition of correct response, which do not exist under the condition of separate presentation. One inhibition derives from rewarding the response to the unilluminated top light (correct response for diagonal M-DRT). Reinforcement of this response provides interference to the correct L-DR. Another inhibition derives from punishment of the response to the illuminated top light (incorrect response in diagonal M-DR). Both inhibitions would act to increase L-DRT.

Just as the decrease in vertical M-DRT remained unexplained in terms of set and ocular factors, so it does not appear to be explainable in terms of inhibitory factors either.

(*B*) *Reliability.*—Table 1 presents the reliability coefficients which were obtained in the present study. Odd-even reliability coefficients were obtained for both conditions of presentation; but test-retest coefficients could be computed for only one condition, the condition of mixed presentation.[7] The obtained product-moment r's were used to compute the Spearman-Brown predicted values for a test length of 50 trials; and these corrected r's were used in drawing the conclusions which follow.

Considering the odd-even r's it would appear that the reliability of L-DRT is higher under the condition of mixed presentation than it is under the condition of separate presentation (r's were 0.94 and 0.84);

[7] Because 11 of the 20 subjects whose data were used for the test-retest correlations had had a previous session under the condition of separate presentation, while the other 9 subjects had had no previous experience with this test, no correlations except those involving performance during sessions 4 and 5 were presented in table 1. The inequalities in practice level between the 2 subgroups within group II were, of course, minimal during the last 2 sessions.

TABLE 1.—*Reliability coefficients*

	Odd-even reliability					
	Light-discriminative reaction time			Matching-discriminative reaction time		
	Number of subjects	Number of trials	Coefficient of correlation	Number of subjects	Number of trials	Coefficient of correlation
Separate presentation	37	25	0.56 [1](.84)	37	40	0.79 [1](.90)
Mixed presentation	15	51	.89 [1](.94)	15	49	.82 [1](.90)
	Test-retest reliability [2]					
Mixed presentation	20	11	.82 [1](.95)	20	39	.74 [1](.79)

[1] Spearman-Brown values for test length of 50 trials in parentheses.
[2] Session 4 with session 5, mixed presentation.

but M-DRT appears to be equally reliable under both conditions (r's were 0.90 and 0.90).[8] Considering both the odd-even r's and the test-retest r's, L-DRT seems more reliable than M-DRT when the condition of mixed presentation is used. Odd-even reliabilities were close: 0.94 for L-DRT and 0.90 for M-DRT, but the test-retest reliability was distinctly higher for L-DRT (0.95 for L-DRT, as compared to 0.79 for M-DRT).

From this it would appear that the most reliable measure is L-DRT, when obtained under the condition of mixed presentation. Odd-even and test-retest r's were higher than 0.90. Such high reliability is a strong recommendation for the use of this measure. The next thing to be considered is its sensitivity.

(*C*) *Sensitivity.*—In order to examine the sensitivity of the test, it was administered to a clinical group of 8 patients with very mild cases of peripheral polyneuropathy, and to a control group of 15 normal subjects. The 2 groups were approximately matched with respect to age. These clinical patients showed no obvious motor incoordination, nor any easily detectable "slowing down" in motor function. Nevertheless, their subjective complaints suggested that such disturbances might be shown upon careful examination with sensitive tests.

The subjects were given 51 trials on L-DRT and 49 trials on M-DRT. The method of mixed presentation was used. The results which were obtained are shown in table 2. This table shows that the clinical patients were very much slower in their reactions than were the control subjects. Statistically, the differences are very reliable

[8] Actually, even under the condition of "separate" presentation, degree of difficulty probably was not uniform throughout the M-DR's, because diagonal M-DRT appears to be more difficult than vertical M-DRT.

TABLE 2.—*Comparison between polyneuropathic subjects and normal subjects, mean RT scores, differences, and reliabilities of the differences* [1]

	Reaction time in 0.01 second					
	Clinical group	Control group	Difference	t	n	P
Light-discriminative reaction time	85.63	55.73	29.90	5.85	21	<0.001
Matching-discriminative reaction time	121.70	75.56	46.14	4.30	19	<0.001

[1] Method of mixed presentation used.

($P < 0.001$). Both L-DRT and M-DRT are shown to be quite sensitive measures, but the t for L-DRT is somewhat higher than that for M-DRT, indicating that L-DRT may be slightly more sensitive.

It might reasonably be supposed that, due to their illness, the clinical patients would be poorly motivated, and almost any test of reaction speed would reveal a difference between their performance and that of normals. However, this supposition was not supported by the results obtained with the Kent-Shakow Formboards (*3*). It was not possible to give the K-S test to all the clinical subjects. But it so happened that the four slowest patients [9] (by our DRT test) were among those to whom the K-S test was given. The average "dexterity" score for these four subjects was at the sixth decile, which means that they did slightly better than the "normal" individual on this test. It would appear from this that low motivation cannot account for the poor scores of the patients on the DRT test. Another indication in the same direction is that the number of erroneous responses was not greater for the clinical group.[10]

These negative results with the K-S test further emphasize the sensitivity of the DRT test. The indication is that the DRT test promises to be useful in detecting mild impairments which cannot be detected with clinical instruments like the K-S test.

SUMMARY

A new portable reaction time apparatus is described. With this apparatus it is possible to time simple reaction, easy discriminative reactions, and more difficult discriminative reactions to light stimuli. The more difficult discriminations involve the matching of colored lights, and these responses are new in the study of reaction time.

A methodological feature, also new in reaction time measurement, was introduced in the present investigation. That is, we required the subject to make easy discriminations and more difficult discriminations in the same series of trials.

[9] Ages were 28, 33, 35, and 41.

[10] M-DRT data from one subject in theclin ical group and from one subject in the control group were rejected because of excessivee rror scores. These rejections were valid according to Scarborough's rule for rejection of observations and measurements (7). The clinical subject made 22 errors; the control subject made 27 errors. The other subjects in the clinical group had error scores ranging from 2 to 10; the other controls had error scores ranging from 2 to 8.

The new RT test and the new method are appraised in terms of reliability and sensitivity. Mixed presentation of easy items and hard items together appears to be a more reliable method than the customarily used method in which level of difficulty remains constant throughout one block of trials.

The new RT test appears to be sensitive in detecting slight impairments in motor performance, and thus holds promise of usefulness in the clinic and for the general purpose of measuring performance decrement.

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THE GEOGRAPHICAL DISTRIBUTION OF ROCKY MOUNTAIN SPOTTED FEVER AND NUTTALL'S COTTONTAIL IN THE WESTERN UNITED STATES [1]

By Wm. L. Jellison, *Sanitarian, United States Public Health Service*

It has long been suspected that Rocky Mountain spotted fever may have its reservoir in some mammal or mammals that are natural hosts of its tick vectors, i. e., *Dermacentor andersoni* Stiles in the western United States, *Dermacentor variabilis* (Say) in the eastern United States, and *Amblyomma americanum* (L.) in some of the South Central and Southeastern States. Positive statements regarding such a reservoir and names of specific animals have been published but convincing evidence has not been presented.

In this paper a very close relationship between the distribution of one species of cottontail, *Sylvilagus nuttallii*, and the distribution of spotted fever in the western United States will be demonstrated, suggesting that this species of animals may be important in the epidemiology of spotted fever in this part of the country and possibly the reservoir or one of the reservoirs of the virus in nature.

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

The range of this cottontail as given by Nelson (*3*) [2] roughly coincides with the main spotted fever endemic area in the western United States as mapped by Philip (*6*), which includes parts of 12 States.

These States include 519 counties, of which 290, or 55.88 percent, are within the range of this rabbit. Of the 7,546 cases of spotted fever recorded at the Rocky Mountain Laboratory up to 1942 (*4*), in which the counties of origin are given, 7,514 cases, or 99.58 percent, occurred in counties within the range of the cottontail rabbit, *S. nuttallii*. For the 12 States listed, the number of cases of spotted fever occurring in counties in which the cottontail rabbit is found, compared with the number of cases occurring in counties in which the cottontail is not found, is as follows: Washington 69:1, Oregon 1,097:3, California 153:2, Montana 1,613:2, Idaho 1,895:9, Nevada 301:0, Wyoming 1,691:0, Utah 262:3, Colorado 383:7, New Mexico 9:0, North Dakota 8:2, and South Dakota 33:3. Almost every county in Montana, Idaho, Nevada, Wyoming, and Utah is within the range of this rabbit so the high proportions of cases in counties within the range of the cottontail are less significant than the proportions from other States.

This study does not take into consideration the scattered cases of spotted fever in Arizona, Arkansas, Iowa, Louisiana, Minnesota, Missouri, Nebraska, Oklahoma, and Texas, or the main spotted fever endemic area in the States east of the Mississippi River where other species of cottontails are present. The few reported Canadian cases, with one possible exception, are within the known range of this rabbit. The genus *Sylvilagus* is represented in Brazil by *S. brasiliensis*. *Sylvilagus* is one of the few North American genera of mammals to extend into Brazil, where Brazilian spotted fever, known also as São Paulo typhus, has been reported. Other species of this genus occur in Colombia, South America, and the State of Sinaloa, Mexico, where diseases presumably identical with spotted fever have been reported.

The cottontail rabbit, *S. nuttallii*, is an important host of the immature stages of the wood tick, *D. andersoni*, and is one of the few mammals that is host to all stages of this tick. It has been found susceptible to the virus of spotted fever; it occurs in great numbers within its range; and otherwise meets the qualifications of a mammalian reservoir of a disease. Spotted fever infection has never been recovered from this host or any other mammal in nature in the highly endemic area in the western United States.[3]

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[2] More recent information on the distribution of Nuttall's cottontail has also been used, and its presence in certain counties of western Montana and northern Idaho beyond the previously known range of the species has been established by collections made during the fall of 1944 by the writer.

[3] There is a report of the probable isolation of spotted fever from a pocket gopher, *Geomys brevicpes dutcheri*, in Oklahoma by Hassler, Sizemore, and Robinson, in a paper read before the American Epidemiological Society, Baltimore, Md., Mar. 20, 1942, but not published. The data were discussed later by Parker, Kohls, and Steinhaus (*5*).

It is a conspicuous fact that not only does the distribution of the Rocky Mountain wood tick, *D. andersoni*, vector of spotted fever in the western United States, closely coincide with the range of the cottontail, *S. nuttallii*, but that each of the other three species of *Dermacentor* known to parasitize small mammals has a distribution coincidental with a species of rabbit. These relationships are as follows: The eastern wood tick, *D. variabilis*, and the eastern cottontail, *S. floridanus;* the Pacific Coast *Dermacentor*, *D. occidentalis* Marx, and the Pacific Coast brush rabbit, *S. bachmani;* and the rabbit *Dermacentor*, *D. parumapertus* Neumann, and the black-tailed jack

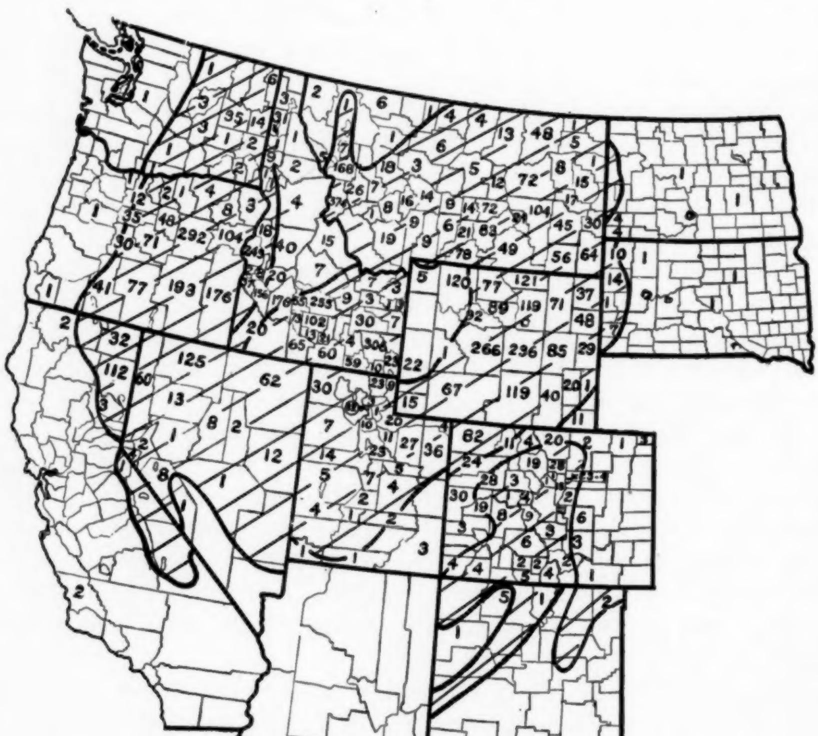

FIGURE 1.—Hatching indicates distribution of Nuttall's cottontail. Numbers indicate spotted fever cases by county, recorded up to 1942. States covered are: Washington, Oregon, Idaho, California, Nevada, New Mexico, Wyoming, Colorado, Utah, Montana, North Dakota, and South Dakota.

rabbit, *Lepus californicus*. The only marked exception in these distribution relationships in the United States, where the ranges of the several species of *Dermacentor* have been mapped by Cooley (*1*), is an area on the Pacific Coast where *D. variabilis* is present beyond the native range of the eastern cottontail. In this area, *D. variabilis* is much scarcer than *D. occidentalis*. Kohls (*2*) by collection and

rearing secured 5,880 adult specimens of *Dermacentor* from Oregon and California, of which only one was identified as *D. variabilis;* the others were *D. occidentalis* with a few *D. parumapertus.* In Canada, *D. andersoni* apparently extends northward into British Columbia and Alberta beyond the known range of the Rocky Mountain cottontail.

Figure 1 illustrates the relationship between the distribution of *Sylvilagus nuttallii* and the distribution of cases of spotted fever. Hatching indicates distribution of *Sylvilagus nuttallii* and numbers indicate cases of spotted fever recorded at the Rocky Mountain Laboratory up to 1942.

SUMMARY

A close geographical association exists between spotted fever and Nuttall's cottontail in the western United States. In 12 western States, 99.58 percent of the spotted fever cases occur within the range of this rabbit, which is present in 55.88 percent of the counties. Other species of cottontails are present in all States or countries where spotted fever has been recognized.

ACKNOWLEDGMENT

Dr. E. R. Hall of the Museum of Zoology, University of Kansas, has aided in mapping the distribution of cottontails and has supplied published and unpublished records supplementary to those given by Nelson (*3*).

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INCIDENCE OF HOSPITALIZATION, JUNE 1945

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities.

Item	June	
	1944	1945
1. Number of plans supplying data	71	81
2. Number of persons eligible for hospital care	13,584,432	18,151,008
3. Number of persons admitted for hospital care	134,792	182,128
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	121.1	122.1
5. Incidence per 1,000 persons, annual rate for the 12 months ended June 30	105.2	104.7
6. Number of plans reporting on hospital days	19	31
7. Days of hospital care per case discharged during month [1]	7.26	8.05

[1] Days include entire stay of patient in hospital whether at full pay or at a discount.

DEATHS DURING WEEK ENDED JULY 21, 1945

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 21, 1945	Corresponding week, 1944
Data for 91 large cities of the United States:		
Total deaths	7,654	7,722
Average for 3 prior years	8,152	
Total deaths, first 29 weeks of year	265,885	269,761
Deaths under 1 year of age	540	603
Average for 3 prior years	623	
Deaths under 1 year of age, first 29 weeks of year	17,559	17,859
Data from industrial insurance companies:		
Policies in force	67,386,739	66,657,503
Number of death claims	13,284	12,127
Death claims per 1,000 policies in force, annual rate	10.3	9.5
Death claims per 1,000 policies, first 29 weeks of year, annual rate	10.7	10.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 28, 1945

Summary

A total of 391 cases of poliomyelitis was reported for the current week as compared with 369 for the preceding week—an increase of only 22 cases as compared with 115 during the preceding week and 172 for the corresponding week last year. The 5-year median for the week is 303, and for the same week last year 740 cases were reported. Of the current cases, 282 occurred in 11 States reporting 10 or more cases each, as follows (last week's figures in parentheses): *Increases*—Connecticut 11 (3), New York 72 (46), Pennsylvania 16 (12), Ohio 14 (8), Tennessee 29 (20), Oklahoma 12 (9); *decreases*—Massachusetts 13 (14), New Jersey 32 (37), Virginia 22 (28), Texas 40 (62), California 21 (25). Currently, 275 cases, or 70 percent, occurred in the Middle Atlantic, South Atlantic, and South Central areas. For the corresponding week last year, 654 cases, or 88 percent of the total, occurred in the Middle Atlantic, East North Central, South Atlantic, and East South Central areas. The cumulative figure through the week ended July 7 was 1,425, as compared with 1,290 for the same period last year. For the 3 weeks since that date, 1,014 cases have been reported, as compared with 1,770 for the corresponding weeks last year.

A total of 111 cases of meningococcus meningitis was reported, as compared with 114 last week and a 5-year median of 54. The total to date is 5,881, as compared with 12,609 for the corresponding period last year, and a 5-year median of 2,242.

Current totals reported for diphtheria, scarlet fever, Rocky Mountain spotted fever, and endemic typhus fever are slightly above the respective 5-year medians, while those for measles, smallpox, typhoid and paratyphoid fever, and whooping cough are below.

A total of 8,344 deaths was recorded for the week in 93 large cities of the United States, as compared with 7,698 last week, 7,971 for the corresponding week last year, and a 3-year (1942–44) average of 7,977. The total to date is 276,164, as compared with 279,883 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended July 28, 1945, and comparison with corresponding week of 1944, and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944	
NEW ENGLAND												
Maine	0	0	0	------	------	------	3	10	20	0	1	1
New Hampshire	0	0	0	------	------	------	1	4	4	1	1	0
Vermont	0	0	0	------	------	------	6	4	20	0	0	0
Massachusetts	4	2	2	------	------	------	115	115	178	5	6	2
Rhode Island	0	1	1	------	8	------	1	11	31	2	3	0
Connecticut	0	1	1	1	------	------	12	17	44	1	3	0
MIDDLE ATLANTIC												
New York	5	7	7	[1] 2	[1] 2	[1] 4	42	190	355	8	25	10
New Jersey	1	1	1	2	2	2	20	58	183	2	8	4
Pennsylvania	7	9	7	------	------	------	169	85	85	10	11	2
EAST NORTH CENTRAL												
Ohio	5	2	3	1	1	2	13	11	43	6	4	1
Indiana	1	5	4	1	------	3	4	8	12	1	4	1
Illinois	5	4	8	2	3	5	129	32	77	8	8	2
Michigan [2]	12	4	1	------	------	------	95	49	133	4	10	1
Wisconsin	2	3	3	------	8	7	42	150	280	3	1	1
WEST NORTH CENTRAL												
Minnesota	14	1	1	------	------	1	6	13	13	2	4	0
Iowa	1	3	1	------	------	------	11	40	28	1	1	1
Missouri	0	3	2	------	------	------	18	6	8	5	6	2
North Dakota	0	0	1	------	------	------	0	0	4	1	0	0
South Dakota	0	2	1	------	------	------	1	2	2	0	0	0
Nebraska	3	7	1	1	2	1	11	3	8	1	1	0
Kansas	6	0	1	------	------	------	11	14	28	0	2	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	0	0	1	0	0	0
Maryland [2]	10	1	1	------	------	1	9	4	27	0	5	3
District of Columbia	0	0	0	------	------	------	0	6	6	1	3	1
Virginia	5	0	3	39	32	45	7	13	35	2	4	2
West Virginia	4	0	2	15	------	2	3	4	5	2	3	3
North Carolina	7	10	7	------	------	------	3	59	21	3	4	1
South Carolina	24	3	4	73	72	87	9	16	15	0	3	2
Georgia	3	2	5	1	54	11	0	10	7	2	1	0
Florida	1	4	3	------	1	3	12	63	12	4	5	0
EAST SOUTH CENTRAL												
Kentucky	4	4	3	------	------	------	15	9	10	0	2	1
Tennessee	2	1	1	6	5	11	2	8	8	2	1	0
Alabama	16	6	4	------	4	4	4	13	19	9	5	3
Mississippi [2]	8	7	3	------	------	------	0	------	------	0	3	0
WEST SOUTH CENTRAL												
Arkansas	4	0	0	2	14	14	4	4	4	1	3	0
Louisiana	3	15	4	1	3	3	2	11	3	4	1	1
Oklahoma	2	4	2	14	1	6	10	5	5	1	0	0
Texas	45	29	27	372	197	187	82	88	88	7	12	2
MOUNTAIN												
Montana	1	1	0	3	------	------	1	1	11	0	0	0
Idaho	1	1	0	6	------	------	36	0	4	0	0	0
Wyoming	0	1	1	------	------	5	1	8	8	0	0	0
Colorado	4	4	4	15	------	14	11	11	16	1	0	0
New Mexico	4	1	1	3	2	1	18	3	9	0	1	0
Arizona	1	4	1	29	12	23	5	7	25	0	0	0
Utah [2]	0	0	0	------	------	------	95	25	25	0	0	0
Nevada	0	0	0	------	------	------	0	0	2	0	0	0
PACIFIC												
Washington	11	5	3	1	------	------	76	41	41	4	5	0
Oregon	1	5	1	------	3	3	25	17	33	1	2	1
California	20	11	10	1	7	24	354	482	292	6	29	6
Total	247	174	150	591	433	436	1,494	1,730	2,999	111	191	54
30 weeks	7,565	6,195	6,915	68,898	337,289	167,969	98,605	587,804	531,495	5,881	12,609	2,242

[1] New York City only. [2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended July 28, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944		July 28, 1945	July 29, 1944	
NEW ENGLAND												
Maine	6	0	0	9	13	7	0	0	0	1	0	1
New Hampshire	2	1	0	4	0	0	0	0	0	0	0	0
Vermont	2	0	0	2	4	0	0	0	0	0	0	1
Massachusetts	13	8	1	32	38	48	0	0	0	1	4	1
Rhode Island	0	0	0	0	1	1	0	0	0	0	0	0
Connecticut	11	3	2	5	8	8	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	72	237	10	212	80	73	0	0	0	5	11	10
New Jersey	32	3	3	15	16	16	0	0	0	2	0	3
Pennsylvania	16	64	5	69	52	52	0	0	0	14	4	7
EAST NORTH CENTRAL												
Ohio	14	40	7	51	66	50	0	0	0	8	8	8
Indiana	2	20	8	12	18	15	0	0	0	2	4	4
Illinois	3	15	6	37	31	41	0	0	0	0	3	7
Michigan [2]	8	30	7	115	33	35	3	0	0	6	1	5
Wisconsin	0	6	1	32	37	33	0	1	0	1	1	0
WEST NORTH CENTRAL												
Minnesota	0	8	2	22	30	18	0	0	0	0	1	0
Iowa	2	4	2	9	42	11	0	0	0	0	1	1
Missouri	2	0	0	11	12	12	0	0	0	5	1	4
North Dakota	0	0	0	1	4	3	0	0	0	1	1	0
South Dakota	0	0	0	1	4	2	0	1	0	0	0	0
Nebraska	0	1	1	8	6	3	0	0	0	0	0	0
Kansas	4	9	8	24	14	15	0	0	0	1	1	2
SOUTH ATLANTIC												
Delaware	0	1	0	0	1	2	0	0	0	0	0	0
Maryland [2]	8	17	1	22	13	9	0	0	0	3	0	1
District of Columbia	5	4	0	5	5	4	0	0	0	1	0	0
Virginia	22	39	3	19	20	13	0	0	0	4	2	8
West Virginia	1	5	3	24	19	12	0	0	0	3	8	5
North Carolina	2	57	3	13	11	11	0	2	0	3	16	7
South Carolina	7	2	2	4	4	3	0	0	0	6	4	10
Georgia	4	8	4	7	10	10	0	0	0	10	10	16
Florida	6	3	1	3	0	3	0	0	0	18	3	3
EAST SOUTH CENTRAL												
Kentucky	3	79	11	19	11	16	0	0	0	6	8	15
Tennessee	29	10	10	10	6	11	0	0	0	6	4	9
Alabama	9	13	6	8	0	10	0	0	0	3	6	9
Mississippi [2]	1	1	1	6	2	3	1	0	0	9	8	8
WEST SOUTH CENTRAL												
Arkansas	0	0	2	2	8	1	0	0	0	6	6	11
Louisiana	6	11	3	1	2	3	0	0	0	2	6	13
Oklahoma	12	3	4	14	2	6	0	0	0	3	4	9
Texas	40	8	8	26	23	15	0	0	0	15	27	29
MOUNTAIN												
Montana	1	1	1	5	9	4	0	0	0	2	2	0
Idaho	0	0	0	4	8	3	0	0	0	1	0	0
Wyoming	2	0	0	0	6	3	0	0	0	0	0	0
Colorado	1	0	0	16	12	12	0	0	0	6	0	2
New Mexico	0	0	1	3	2	2	0	0	0	1	0	3
Arizona	1	1	0	2	4	2	0	0	0	0	0	3
Utah [2]	11	2	2	3	6	4	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	9	1	1	17	22	8	0	0	0	4	1	1
Oregon	1	12	4	6	10	4	0	0	0	0	1	1
California	21	13	13	103	94	45	0	0	0	6	6	6
Total	391	740	303	1,013	819	706	4	4	5	166	163	246
30 weeks	2,439	3,060	1,526	132,165	145,388	95,462	259	287	602	2,299	2,747	3,362

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever reported separately, as follows: Massachusetts, 1; Ohio, 1; Michigan, 4; Maryland, 3; Georgia, 1; Florida, 1; Arkansas, 7; Texas, 1; Montana, 1.

Telegraphic morbidity reports from State health officers for the week ended July 28, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 28, 1945							
	Week ended—		Median 1940–44	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	July 28, 1945	July 29, 1944		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	51	24	25	0	0	0	0	0	0	0	1
New Hampshire	2	0	0	0	0	0	0	0	0	0	0
Vermont	21	33	23	0	0	0	1	0	0	0	3
Massachusetts	140	66	126	1	27	0	0	0	0	0	1
Rhode Island	0	6	6	0	0	0	0	0	0	0	0
Connecticut	71	52	57	0	13	0	0	1	0	0	3
MIDDLE ATLANTIC											
New York	378	174	279	4	15	0	3	0	0	1	13
New Jersey	195	84	115	0	1	0	1	0	0	0	3
Pennsylvania	244	94	293	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL											
Ohio	192	172	267	0	0	1	1	0	0	0	4
Indiana	25	9	27	1	0	0	1	0	0	0	3
Illinois	165	72	146	1	0	0	0	1	0	0	10
Michigan [3]	143	81	262	4	0	0	0	0	0	0	1
Wisconsin	87	135	186	0	0	0	0	0	0	0	5
WEST NORTH CENTRAL											
Minnesota	10	29	46	0	0	0	0	0	0	0	1
Iowa	17	8	31	0	0	0	0	0	0	0	0
Missouri	45	15	22	0	0	0	0	0	2	0	5
North Dakota	3	10	10	0	0	0	0	0	0	0	0
South Dakota	0	10	5	0	0	0	0	0	0	0	1
Nebraska	4	29	19	0	0	0	0	0	0	0	0
Kansas	41	33	71	0	0	0	0	1	2	0	7
SOUTH ATLANTIC											
Delaware	8	0	1	0	0	0	0	0	0	0	1
Maryland [3]	76	90	90	0	0	5	0	5	0	0	1
District of Columbia	10	0	12	0	0	0	0	0	0	0	0
Virginia	99	92	68	0	0	292	0	8	0	1	5
West Virginia	46	28	28	0	0	0	0	3	0	0	0
North Carolina	189	246	117	0	4	0	0	3	0	1	1
South Carolina	67	67	67	0	59	0	0	0	0	4	0
Georgia	17	13	16	1	4	1	0	0	1	35	1
Florida	15	18	19	0	1	0	0	0	0	6	0
EAST SOUTH CENTRAL											
Kentucky	52	87	76	0	0	0	0	0	0	0	0
Tennessee	33	34	40	0	0	0	1	0	0	2	2
Alabama	33	14	23	1	0	0	0	1	0	30	4
Mississippi [3]	------	0	------	0	0	0	0	0	0	9	2
WEST SOUTH CENTRAL											
Arkansas	12	14	16	1	40	0	0	1	11	0	2
Louisiana	1	1	5	3	0	0	0	0	0	5	0
Oklahoma	14	3	16	0	3	0	0	0	4	0	1
Texas	213	164	232	13	532	10	0	0	0	57	15
MOUNTAIN											
Montana	7	37	24	0	0	0	0	0	1	0	2
Idaho	9	1	6	0	0	1	0	1	0	0	3
Wyoming	1	5	8	0	0	0	0	0	0	0	0
Colorado	62	27	28	0	0	0	0	2	0	0	7
New Mexico	4	2	9	0	0	3	0	0	0	0	0
Arizona	19	21	10	0	0	30	0	0	0	0	0
Utah [3]	23	72	78	0	0	0	0	1	0	0	0
Nevada	0	2	0	0	0	0	0	0	1	0	0
PACIFIC											
Washington	34	30	36	0	0	0	0	0	0	0	2
Oregon	25	12	15	0	0	0	0	0	0	0	2
California	212	85	231	2	2	0	15	0	1	0	3
Total	3,115	2,301	3,693	32	701	343	23	28	23	151	115
Same week 1944	2,301	------	------	48	745	313	8	22	11	251	76
Average, 1942-44	3,267	------	------	54	531	379	11	[4] 22	14	[4] 120	------
30 Weeks, 1945	76,405	------	------	1,077	14,308	4,219	228	259	479	2,137	2,844
1944	56,565	------	------	954	12,080	4,264	331	284	355	2,079	2,077
Average, 1942-44	97,105	------	[4] 112,867	935	8,478	3,704	317	[4] 284	498	[4] 1,391	------

[3] Period ended earlier than Saturday.
[4] 5-year median, 1940–44.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 21, 1945

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	0	0	1	1	0	0	0	0
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	6	0	0	0
Vermont:												
Barre	0	0	------	0	2	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	33	1	11	3	13	0	1	51
Fall River	0	0	------	0	0	0	0	0	0	0	0	4
Springfield	0	0	------	0	1	0	0	0	5	0	0	0
Worcester	0	0	------	0	26	0	6	0	2	0	0	3
Rhode Island:												
Providence	0	0	------	0	0	1	1	0	1	0	0	4
Connecticut:												
Bridgeport	0	0	------	0	0	1	0	0	0	0	1	0
Hartford	0	0	------	0	1	0	0	0	1	0	0	0
New Haven	0	0	------	0	0	1	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	0	0	2	6	1	0	0	8
New York	6	0	2	1	46	10	34	13	34	0	4	132
Rochester	0	0	------	0	0	0	1	5	2	0	0	6
Syracuse	0	0	------	0	0	0	1	0	5	0	0	58
New Jersey:												
Camden	0	0	------	0	2	0	2	1	2	0	0	3
Newark	0	0	------	0	5	1	0	2	2	0	0	17
Trenton	0	0	------	0	0	0	3	11	1	0	0	0
Pennsylvania:												
Philadelphia	0	0	------	0	62	0	7	6	11	0	1	95
Pittsburgh	3	1	------	1	0	1	6	0	5	0	1	24
Reading	0	0	------	0	0	0	1	0	0	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	4	1	9	2	2	0	0	8
Cleveland	0	0	2	0	3	1	5	1	7	0	0	76
Columbus	0	0	------	0	1	0	0	1	4	0	0	5
Indiana:												
Fort Wayne	0	0	------	0	0	0	1	0	0	0	0	0
Indianapolis	2	0	------	0	1	1	4	0	1	0	1	3
South Bend	0	0	------	0	0	0	0	0	1	0	0	2
Terre Haute	0	0	------	0	0	0	0	0	2	0	0	2
Illinois:												
Chicago	1	0	------	0	139	2	15	1	30	0	0	45
Springfield	0	0	------	0	0	0	1	1	0	0	0	2
Michigan:												
Detroit	6	0	------	0	44	2	4	1	29	0	0	71
Flint	0	0	------	0	1	0	3	0	3	0	0	1
Grand Rapids	0	0	------	0	0	0	1	0	3	0	0	2
Wisconsin:												
Kenosha	0	0	------	0	4	0	0	0	0	0	0	2
Milwaukee	0	0	------	0	8	1	0	0	9	0	0	0
Racine	0	0	------	0	0	0	0	0	1	0	0	9
Superior	0	0	------	0	2	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	0	1	0	0	3	0	0	1
Minneapolis	0	0	------	0	0	1	0	0	10	0	0	2
St. Paul	0	0	------	0	2	1	2	0	3	0	0	5
Missouri:												
Kansas City	0	0	------	0	6	0	9	0	8	0	1	7
St. Joseph	0	0	------	0	1	0	0	0	1	0	0	0
St. Louis	1	1	1	1	1	6	9	3	0	0	4	30

City reports for week ended July 21, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	1	0	0	0	0	0	0	0
Nebraska:												
Omaha	0	0	------	0	0	0	0	1	7	0	0	0
Kansas:												
Topeka	0	0	------	0	0	0	0	0	3	0	0	2
Wichita	0	0	------	0	0	0	3	0	3	0	0	11
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	2	0	0	0	0	0	0	0
Maryland:												
Baltimore	0	0	------	0	2	1	6	1	4	0	0	72
Cumberland	0	0	------	0	0	0	0	0	1	0	0	0
Frederick	0	0	------	0	0	0	1	0	0	0	0	0
District of Columbia:												
Washington	0	0	------	0	0	0	4	9	4	0	0	10
Virginia:												
Lynchburg	0	0	------	0	0	0	0	1	0	0	0	0
Richmond	0	0	------	0	0	0	1	2	1	0	2	0
Roanoke	1	0	------	0	6	0	0	0	0	0	0	0
West Virginia:												
Wheeling	0	0	------	0	0	0	0	0	0	0	0	0
North Carolina:												
Raleigh	0	0	------	0	0	0	1	0	0	0	0	4
Wilmington	0	0	------	0	0	1	0	0	0	0	0	6
Winston-Salem	0	0	------	0	0	0	0	0	0	0	0	6
South Carolina:												
Charleston	0	0	------	0	0	0	0	0	0	0	0	1
Georgia:												
Atlanta	0	0	------	0	0	1	2	0	1	0	0	5
Brunswick	0	0	------	0	0	0	0	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	3	0	2	0	1	0	0	2
Nashville	0	0	------	0	0	0	0	1	0	0	0	2
Alabama:												
Birmingham	0	0	------	0	0	0	4	1	0	0	0	4
Mobile	0	0	------	0	0	1	1	0	0	0	1	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	0	0	1	0	0	0	0	0
Louisiana:												
New Orleans	4	0	2	1	0	0	5	2	0	0	3	2
Shreveport	0	0	------	0	0	0	3	3	0	0	0	0
Texas:												
Dallas	0	0	------	0	2	0	0	5	3	0	0	10
Galveston	0	0	------	0	0	0	0	2	0	0	0	2
Houston	0	0	------	0	0	0	5	6	1	0	0	1
San Antonio	1	0	------	0	0	0	2	5	1	0	1	0
MOUNTAIN												
Montana:												
Billings	1	0	------	0	0	0	2	0	0	0	0	0
Great Falls	0	0	------	0	2	1	0	0	1	0	0	0
Helena	0	0	------	0	2	0	0	0	1	0	0	0
Missoula	0	0	------	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	1	0	1	0	4	0	5	1	4	0	0	25
Pueblo	0	0	------	0	0	0	0	0	0	0	0	2
Utah:												
Salt Lake City	0	0	------	0	25	0	1	1	1	0	0	4

City reports for week ended July 21, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	1	0		0	31	0	4	0	4	0	0	11
Spokane	0	0		0	1	1	0	0	0	0	0	0
Tacoma	0	0		0	19	0	0	0	0	0	0	7
California:												
Los Angeles	2	0	1	0	25	3	2	2	16	0	0	22
Sacramento	1	0		0	2	0	0	0	4	0	0	3
San Francisco	1	0		0	57	1	8	4	8	0	0	4
Total	32	2	9	4	573	43	202	105	277	0	21	900
Corresponding week, 1944	41		5	7	475		225		231	0	33	730
Average, 1940-44	40		23	[1] 7	[2] 1,020		[1] 236		269	0	31	1,090

[1] 3-year average 1942-44.
[2] 5-year median 1940-44.

Dysentery, amebic.—Cases: Nashville, 1; San Antonio, 1; Los Angeles, 3.
Dysentery, bacillary.—Cases: Providence, 1; New York, 1; Cleveland, 6; Detroit, 1; St. Louis, 3; Charleston, S. C., 12; Los Angeles, 3.
Dysentery, unspecified.—Cases: Newark, 1; Baltimore, 1.
Leprosy.—Cases: San Francisco, 1.
Rocky Mountain spotted fever.—Cases: New York, 1; Philadelphia, 1; Wichita, 1; Washington, 1; Richmond, 1.
Typhus fever, endemic.—Cases: Wilmington, N. C., 1; Mobile, 1; New Orleans, 3; Shreveport, 1; Dallas, 1; Houston, 4; San Antonio, 4.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 34,054,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	0.0	0.0	0.0	0.0	165	10.5	49.7	10.5	73	0.0	5.2	165
Middle Atlantic	4.2	0.5	0.9	0.9	53	5.6	26.4	20.4	29	0.0	2.8	160
East North Central	5.5	0.0	1.2	0.0	126	4.9	26.1	4.3	56	0.0	0.6	139
West North Central	2.0	2.0	2.0	2.0	22	17.9	45.8	8.0	76	0.0	9.9	115
South Atlantic	1.8	0.0	0.0	0.0	7	5.4	27.2	23.6	20	0.0	3.6	189
East South Central	0.0	0.0	0.0	0.0	18	5.9	41.3	11.8	6	0.0	5.9	47
West South Central	14.3	0.0	5.7	2.9	6	0.0	45.9	66.0	14	0.0	11.5	43
Mountain	16.5	0.0	8.3	0.0	273	8.3	66.0	16.5	58	0.0	0.0	256
Pacific	7.9	0.0	1.6	0.0	214	7.9	22.1	9.5	51	0.0	0.0	74
Total	4.9	0.3	1.4	0.6	88	6.6	31.0	16.1	43	0.0	3.2	138

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 7, 1945.—During the week ended July 7, 1945, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		8		32	203	45	23	133	64	508
Diphtheria		6	4	18		5		3		36
Dysentery, bacillary				14						14
German measles		2		6	45	2	5	39	8	107
Influenza		7			27				5	39
Measles		1		90	120	13	17	90	85	416
Meningitis, meningococcus					1			1	1	3
Mumps		1		41	49	23	13	47	8	182
Poliomyelitis				2	2			1	1	6
Scarlet fever	2	4	11	30	36	12	4	10	8	117
Tuberculosis (all forms)		1	7	216	21	11	1	17	40	314
Typhoid and paratyphoid fever			1	9			2	1		13
Venereal diseases:										
Gonorrhea	1	15	10	141	114	46	32	29	47	435
Syphilis		11	4	114	65	11	4	2	23	234
Other forms	1			1						2
Whooping cough			9	73	36	4	1	17	1	141

CHINA

Notifiable diseases—March 1945.—During the month of March 1945, certain notifiable diseases were reported in China as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	816	92	Scarlet fever	66	10
Cholera	7	2	Smallpox	468	45
Diphtheria	66	12	Typhoid fever	511	44
Dysentery	871	18	Typhus fever	477	40
Relapsing fever	973	20			

CUBA

Habana—Communicable diseases—4 weeks ended June 23, 1945.—During the 4 weeks ended June 23, 1945, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	5		Tuberculosis	10	
Diphtheria	16		Typhoid fever	33	3

Provinces—Notifiable diseases—4 weeks ended June 16, 1945.—During the 4 weeks ended June 16, 1945, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer			4	8		11	23
Chickenpox		5			2	5	12
Diphtheria		24	1		1		26
Hookworm disease				1			1
Leprosy	1	1		1		1	4
Malaria	2	4		10		14	30
Measles		1	1			21	23
Poliomyelitis						1	1
Tuberculosis	6	20	24	20	26	17	113
Typhoid fever	25	104	31	121	44	31	356
Typhus fever	1						1

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—May 1945.—During the month of May 1945, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	33	Mumps	586
Chickenpox	579	Paratyphoid fever	311
Conjunctivitis	13	Pneumonia (all forms)	2,560
Diphtheria	1,233	Poliomyelitis	34
Dysentery	15	Puerperal fever	31
Gastroenteritis	2,267	Rheumatic fever	271
Gonorrhea	1,887	Scabies	3,066
Hepatitis, epidemic	666	Scarlet fever	390
Influenza	749	Syphilis	373
Laryngitis	27	Typhoid fever	50
Malaria	148	Vincent's angina	35
Measles	178	Whooping cough	2,876

JAMAICA

Kingston—Influenza.—Information dated June 23, 1945, stated that a mild form of influenza was reported in Kingston, Jamaica. It was stated that since June 1, 1945, about 60 or 70 percent of the population of Kingston were suffering from an attack of influenza. Due to the epidemic the Jamaica Base Command declared Kingston "off limits" to all military personnel except those on official business.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

British East Africa—Kenya—Nyeri District.—During the week ended July 21, 1945, 13 cases of plague with 5 deaths were reported in Nyeri District, Kenya, British East Africa.

Egypt.—For the week ended June 23, 1945, 13 cases of plague were reported in Egypt. For the period July 12–18, 1945, 3 cases of plague with 2 deaths were reported in Port Said, Egypt, and for the week ended May 26, 1945, 5 cases of plague were reported in Ismailiya, Egypt.

Morocco (French).—For the period July 1–10, 1945, 38 cases of plague were reported in French Morocco. On July 23, 1945, 1 case of suspected plague was reported in Casablanca, French Morocco.

Smallpox

Morocco (French).—For the period July 1–10, 1945, 287 cases of smallpox, including 275 cases in the region of Fez, were reported in French Morocco.

Union of South Africa.—For the period June 1 to July 2, 1945, 26 cases of smallpox were reported in Johannesburg. In Alexandria, since the beginning of the outbreak up to June 11, 1945, 69 cases of smallpox were reported. The cases reported are said to be of the virulent type. Vaccination is being carried on.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: June 11–20, 1945, 26 cases, including 7 cases reported in Algiers; June 21–30, 1945, 16 cases including 13 cases in Algiers.

Bulgaria.—For the period May 1–27, 1945, 159 cases of typhus fever were reported in Bulgaria.

Egypt.—For the week ended June 23, 1945, 339 cases of typhus fever with 62 deaths were reported in Egypt.

Morocco (French).—For the period July 1–10, 1945, 136 cases of typhus fever were reported in French Morocco, including 6 cases in Casablanca, 2 cases in Fez, 15 cases in Marrakesh, 3 cases in Meknes, and 1 case in Rabat.

Sweden.—For the month of May 1945, 192 cases of typhus fever, including 81 cases in Malmo, were reported in Sweden.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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